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Abstract

IMPORTANCE OF THE CLASSICAL SUPERHEAT IN THE NUCLEAR POWER STATIONS IN THE NEXT DECADES

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It could be stated that in the next decades the nuclear power stations will be constructed simultaneously with the classical power stations. The studies and calculations have demonstrated that, until the technology of high temperature reactors will be completely solved, it will be more economical to construct combined power stations in which heat from the reactor will serve only to evaporate water, and fossil fuel will be used to superheat the steam. In this case reactors could be constructed for medium temperatures. The studies of the availability of different types of the reactors have proved, that only the medium temperature reactors are in the present time really available. It is well known that pressurised water reactors /for instance Indian Point/ and boiling water reactors can work with the simple superheat. The paper shows that the boiling water graphite reactors /Bielojarsk type/ and the reactors cooled by organic liquid or by gas can also economically work in the scheme of superheat and reheat. The conception of the graphite moderated, carbon dioxide cooled Magnox type reactor in the scheme of supercritical pressure and double reheat was analyzed. In this scheme the reactor heat exchanger produces supercritical steam for the main turbine. There exists a second separate low pressure circuit for the auxiliary propulsion /carbon dioxide blowers and feed pumps/. The influence of the superheat on the cost of the turbosets is analysed. The preliminary design and calculations have proved, that incremental power done by superheating is cheaper than in the conventional power stations and the efficiency of the fuel burning is better. The conclusion of the paper is the following: If the nuclear and classical power stations will be constructed simultaneously in any country, the best economical solution in the next decade might be the construction of combined nuclear - conventional power stations i.e. nuclear steam generator with the conventional superheat.